Amendments to the Claims

Claim 1 (currently amended): A digital predistortion circuit for compensating nonlinear distortion introduced by analog-transmitter components of a digital communications transmitter, said predistortion circuit comprising:

a source of a complex-forward-data stream configured to digitally convey information;

a basis-function generator coupled to said complex-forward-data-stream source and configured to generate a complex-basis-function-data stream in response to said complex-forward-data stream, wherein said complex-basis-function-data stream is responsive to $X(n)^{\bullet} |X(n)|^{K}$, where $X(n)$ represents said complex-forward-data stream, and K is an integer greater than or equal to one;

a filter coupled to said basis-function generator and configured to generate a complex-filtered-basis-function-data stream in response to said complex-basis-function-data stream; and

a combination circuit for combining said complex-filtered-basis-function-data stream and said complex-forward-data stream to compensate for said nonlinear distortion.

Claim 2 (original): A predistortion circuit as claimed in claim 1 wherein said filter is an equalizer defined by filter coefficients.

Claim 3 (original): A predistortion circuit as claimed in claim 2 additionally comprising a feedback section adapted to receive a feedback signal from said analog-transmitter components and to generate a return-data stream, said feedback section being

coupled to said equalizer so that said filter coefficients are responsive to said return-data stream.

Claim 4 (original): A predistortion circuit as claimed in claim 3 wherein:

said complex-forward-data stream exhibits a forward resolution; and

said return-data stream exhibits a return resolution less than said forward resolution.

Claim 5 (original): A predistortion circuit as claimed in claim 3 additionally comprising a programmable delay element coupled between said basis-function generator and said feedback section, said programmable delay element being configured to produce a delayed-complex-forward-data stream temporally aligned with said return-data stream.

Claim 6 (original): A predistortion circuit as claimed in claim 3 wherein:

said equalizer implements an estimation-and-convergence algorithm to determine said filter coefficients;

said estimation-and-convergence algorithm is responsive to said complex-basis-function-data stream and to said return-data stream;

said complex-forward-data stream and said return-data stream exhibit forward-error and return-error levels, respectively, with said return-error level being greater than said forward-error level; and

said estimation-and-convergence algorithm is configured to transform increased algorithmic processing time into reduced effective-error level for said return-data stream.

Claim 7 (original): A predistortion circuit as claimed in claim 2 wherein said equalizer implements an estimation-and-convergence algorithm to determine said filter coefficients.

Claim 8 (original): A predistortion circuit as claimed in claim 2 wherein:

said equalizer is a non-adaptive equalizer configured to be programmed with said filter coefficients; and

said predistortion circuit additionally comprises an adaptation engine selectively coupled to said non-adaptive equalizer and configured to implement an estimation-and-convergence algorithm which determines said filter coefficients.

Claim 9 (original): A predistortion circuit as claimed in claim 8 additionally comprising a controller coupled to said non-adaptive equalizer and to said adaptation engine, said controller being configured to couple said adaptation engine to said non-adaptive equalizer to determine said filter coefficients and to decouple said adaptation engine from said non-adaptive equalizer.

Claim 10 (original): A predistortion circuit as claimed in claim 8 wherein:

said non-adaptive equalizer is a complex equalizer having an in-phase path, a quadrature path, an in-phase-to-quadrature path, and a quadrature-to-in-phase path;

a first set of said filter coefficients is programmed in said in-phase and quadrature paths, and a second set of said filter coefficients is programmed in said in-phase-to-quadrature and quadrature-to-in-phase paths; and

said adaptation engine accommodates a partial complex equalizer and has first and second paths, said first and second paths being configured in one mode to determine said filter coefficients for said in-phase and quadrature paths, and being

configured in another mode to determine said filter coefficients
for said in-phase-to-quadrature and quadrature-to-in-phase paths.

Claim 11 (canceled).

Claim 12 (original): A predistortion circuit as claimed in
claim 1 wherein said basis-function generator generates a
plurality of complex-basis-function-data streams.

Claim 13 (original): A predistortion circuit as claimed in
claim 12 wherein:
said filter is a first equalizer that processes a first one
of said plurality of complex-basis-function-data streams;
one or more additional equalizers respectively process other
ones of said plurality of complex-basis-function-data streams;
and
said first equalizer and said one or more additional
equalizers couple to said combination circuit.

Claim 14 (original): A predistortion circuit as claimed in
claim 13 wherein:
said first equalizer and said one or more additional
equalizers are non-adaptive equalizers; and
said predistortion circuit additionally comprises an
adaptation engine selectively coupled to said non-adaptive
equalizers, said adaptation engine being configured to implement
an estimation-and-convergence algorithm which determines filter
coefficients for said non-adaptive equalizers.

Claim 15 (original): A predistortion circuit as claimed in
claim 14 wherein:

each of said non-adaptive equalizers is a complex equalizer having an in-phase path, a quadrature path, an in-phase-to-quadrature path, and a quadrature-to-in-phase path;

for each of said non-adaptive equalizers, a first set of said filter coefficients is programmed in said in-phase and quadrature paths, and a second set of said filter coefficients is programmed in said in-phase-to-quadrature and quadrature-to-in-phase paths; and

said adaptation engine accommodates a partial complex equalizer and has first and second paths, said first and second paths being configured in one mode to determine filter coefficients for said in-phase and quadrature paths, and being configured in another mode to determine said filter coefficients for said in-phase-to-quadrature and quadrature-to-in-phase paths.

Claim 16 (original): A predistortion circuit as claimed in claim 1 wherein:

said basis-function generator is configured to generate a plurality of substantially orthogonal basis functions;

each of said basis functions is responsive to $X(n)^{\bullet}|X(n)|^{K}$, where $X(n)$ represents said complex-forward-data stream and K is an integer greater than or equal to one; and

each of said basis functions produces a complex-basis-function-data stream.

Claim 17 (original): A predistortion circuit as claimed in claim 1 wherein:

said predistortion circuit additionally comprises a heat estimator adapted to receive a signal responsive to said complex-forward-data stream and to generate a heat signal responsive to relative power in said complex-forward-data stream; and

said heat estimator couples to said filter so that said heat signal influences said complex-filtered-basis-function-data stream.

Claim 18 (original): A predistortion circuit as claimed in claim 17 wherein said filter is an adaptive equalizer that is responsive to said heat signal.

Claim 19 (original): A predistortion circuit as claimed in claim 18 wherein said adaptive equalizer is configured to maximally correlate change in filter coefficients with change in power exhibited by said complex-forward-data stream.

Claim 20 (original): A predistortion circuit as claimed in claim 17 wherein said heat estimator is configured so that said heat signal is responsive to instantaneous changes in power of said complex-forward-data stream relative to an average power of said complex-forward-data stream over time.

Claim 21 (original): A digital predistortion circuit for compensating nonlinear distortion introduced by analog-transmitter components of a digital communications transmitter, said predistortion circuit comprising:

a source of a forward-data stream configured to digitally convey information;

a basis-function generator coupled to said source and configured to generate a basis-function-data stream in response to said forward-data stream;

a heat estimator adapted to receive a signal responsive to said forward-data stream and to generate a heat signal responsive to power of said forward-data stream;

a digital equalizer section coupled to said basis-function generator and to said heat estimator, said equalizer section

being configured to generate a filtered-basis-function-data
stream in response to said basis-function-data stream and said
heat signal; and

a combination circuit for combining said filtered-basis-
function-data stream and said forward-data stream to compensate
for said nonlinear distortion.

Claim 22 (original): A predistortion circuit as claimed in
claim 21 wherein said equalizer section includes an adaptive
equalizer that is responsive to said heat signal.

Claim 23 (original): A predistortion circuit as claimed in
claim 22 wherein:

said adaptive equalizer determines filter coefficients so
that said basis-function-data stream is filtered into said
filtered-basis-function-data stream in response to said filter
coefficients; and

said adaptive equalizer is configured to maximally correlate
changes in said filter coefficients with changes in magnitude
exhibited by said complex-forward-data stream.

Claim 24 (original): A predistortion circuit as claimed in
claim 23 wherein said adaptive equalizer is configured to
determine heat-sensitivity coefficients which, when multiplied by
said heat signal, cause said heat signal to maximally correlate
with said changes in said filter coefficients.

Claim 25 (original): A predistortion circuit as claimed in
claim 23 wherein said changes in said filter coefficients are
determined in response to average filter coefficient values
determined over a preceding duration.

Claim 26 (original): A predistortion circuit as claimed in claim 21 wherein said heat estimator is configured so that said heat signal is responsive to instantaneous changes in magnitude of said forward-data stream relative to an average magnitude of said forward-data stream over time.

Claim 27 (original): A predistortion circuit as claimed in claim 21 wherein:

said equalizer section includes an adaptive equalizer that generates filter coefficients and is responsive to said heat signal;

said adaptive equalizer is configured to generate a filter-coefficient-change signal responsive to changes in said filter coefficients; and

said heat estimator is configured to delay said heat signal into temporal alignment with said filter-coefficient-change signal.

Claim 28 (original): A predistortion circuit as claimed in claim 21 additionally comprising a feedback section adapted to receive a feedback signal from said analog-transmitter components and to generate a return-data stream, said feedback section being coupled to said equalizer section so that filter coefficients are responsive to said return-data stream and to said heat signal.

Claim 29 (original): A predistortion circuit as claimed in claim 28 wherein:

said forward-data stream exhibits a forward resolution; and

said return-data stream exhibits a return resolution less than said forward resolution.

Claim 30 (original): A predistortion circuit as claimed in claim 21 wherein said basis-function generator generates a plurality of basis-function-data streams.

Claim 31 (original): A predistortion circuit as claimed in claim 30 wherein:

said equalizer section includes a plurality of equalizers;

a first one of said plurality of equalizers processes a first one of said plurality of basis-function-data streams;

one or more additional ones of said plurality of equalizers respectively process other ones of said plurality of basis-function-data streams; and

said first equalizer and said one or more additional equalizers couple to said combination circuit.

Claim 32 (original): A predistortion circuit as claimed in claim 31 wherein:

said first equalizer and said one or more additional equalizers are non-adaptive equalizers; and

said equalizer section additionally comprises an adaptation engine coupled to each of said non-adaptive equalizers, said adaptation engine being configured to implement an estimation-and-convergence algorithm which determines filter coefficients for said non-adaptive equalizers.

Claim 33 (original): A predistortion circuit as claimed in claim 21 wherein:

said forward-data stream is a complex data stream;

said basis-function generator is configured to generate a plurality of basis functions;

each of said basis functions is responsive to $X(n)^{\bullet}|X(n)|^{K}$, where $X(n)$ represents said forward-data stream and K is an integer greater than or equal to one; and

each of said basis functions produces a complex-basis-function-data stream.

Claim 34 (original): A method of digitally compensating for nonlinear distortion introduced by analog-transmitter components of a digital communications transmitter, said method comprising:

providing a forward-data stream configured to digitally convey information;

generating a basis-function-data stream responsive to $X(n)^{\bullet}|X(n)|^{K}$, where $X(n)$ represents said forward-data stream, and K is an integer greater than or equal to one;

filtering said basis-function-data stream to generate a filtered-basis-function-data stream; and

combining said filtered-basis-function-data stream and said forward-data stream to compensate for said nonlinear distortion.

Claim 35 (original): A method as claimed in claim 34 wherein said filtering activity filters said basis-function-data stream in a manner determined by filter coefficients, and said method additionally comprises:

down-converting a feedback signal obtained from said analog-transmitter components to generate a return-data stream; and

processing said return-data stream to generate said filter coefficients.

Claim 36 (original): A method as claimed in claim 35 wherein:

said return-data stream exhibits a lower resolution than is exhibited by said forward-data stream; and

said return-data stream exhibits a lower resolution than is exhibited by said basis-function-data stream.

Claim 37 (original): A method as claimed in claim 34 wherein said filtering activity filters said basis-function-data stream in response to filter coefficients, and said method additionally comprises:

generating a heat signal in response to said forward-data stream; and

adjusting said filter coefficients in response to said heat signal.

Claim 38 (original): A method as claimed in claim 37 wherein said heat-signal-generating activity is configured so that said heat signal is responsive to instantaneous changes in power of said forward-data stream relative to an average power of said forward-data stream over time.

Claim 39 (original): A method as claimed in claim 34 wherein said filtering activity filters said basis-function-data stream in response to filter coefficients, and said method additionally comprises:

down-converting a feedback signal obtained from said analog-transmitter components to generate a return-data stream;

processing said forward-data stream and said return-data stream to generate said filter coefficients;

generating a heat signal in response to said forward-data stream; and

processing said filter coefficients and said heat signal to generate heat-sensitivity coefficients; and

adjusting said filter coefficients in response to said heat signal and said heat-sensitivity coefficients.

Claim 40 (original): A method as claimed in claim 39 wherein each of said processing activities comprises implementing an estimation-and-convergence algorithm.

Claim 41 (original): A method as claimed in claim 34
wherein:

said filtering activity filters said basis-function-data
stream in response to filter coefficients;

said filtering activity is performed by a programmable
digital equalizer section which includes a non-adaptive equalizer
selectively coupled to an adaptation engine; and

said method additionally comprises coupling said adaptation
engine to said non-adaptive equalizer to determine said filter
coefficients, then decoupling said adaptation engine from said
non-adaptive equalizer.

Claim 42 (original): A method as claimed in claim 41
wherein:

each of said forward-data stream, said basis-function-data
stream, and said filtered-basis-function-data stream is a
complex-data stream;

said non-adaptive equalizer is a complex equalizer having
first and second sets of filter coefficients;

said adaptation engine accommodates a partial complex
equalizer; and

as a result of said coupling activity, said adaptation
engine identifies said first set of filter coefficients, then
after identifying said first set of filter coefficients
identifies said second set of filter coefficients.

Claim 43 (original): A method as claimed in claim 34
wherein:

said generating activity generates a plurality of basis
functions, with each of said basis functions being responsive to
$X(n)^{\bullet}|X(n)|^{K}$, where $X(n)$ represents said forward-data stream and
K is an integer greater than or equal to one, and with each of

said basis functions producing its own basis-function-data
stream;

said filtering activity filters each of said plurality of
basis-function-data streams to generate a corresponding plurality
of filtered-basis-function-data streams; and

said combining activity combines said plurality of filtered-
basis-function-data streams with said forward-data stream to
compensate for said nonlinear distortion.

Claim 44 (original): A method as claimed in claim 43
wherein, for each of said plurality of basis-function-data
streams, said filtering activity filters said basis-function-data
stream in a manner determined by a filter-coefficient set
configured for said basis-function-data stream, and said method
additionally comprises:

down-converting a feedback signal obtained from said analog-
transmitter components to generate a return-data stream; and

processing said return-data stream to sequentially generate
said filter-coefficient sets.

Claim 45 (original): A method as claimed in claim 44
wherein:

said filtering activity is performed by a digital equalizer
section which includes a plurality of non-adaptive equalizers and
an adaptation engine; and

said method additionally comprises sequentially coupling
said adaptation engine to each of said non-adaptive equalizers so
that said adaptation engine will converge upon one of said
filter-coefficient sets, then programming said one of said
filter-coefficient sets into a corresponding one of said non-
adaptive equalizers, and decoupling said adaptation engine from
said corresponding one of said non-adaptive equalizers.

Claim 46 (new): A method as claimed in claim 43 wherein each of said plurality of basis-function-data streams is substantially orthogonal to the others of said plurality of basis-function-data streams.